

Low Profile Fan Duct Motherboard and Chassis Specification

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1 Relevant Documents

Document Number	Document Title
58178-01	Intel Document for Qualification Testing
693943 Rev 01	Enabling Components Qualification Testing
	Low Profile Fan Duct System Design Guidelines
	Low Profile Fan Duct System Board and Chassis Specification

2 Scope

The purpose of the *Low Profile Fan Duct System Board and Chassis Specification* is to provide the necessary board and chassis requirements for implementing the Low Profile Fan Duct system. The specification is intended for chassis, motherboard, and system integrators in order to enable them to develop a low cost cooling solution.

3 Overview

Although the processor still has one of the highest thermal power outputs in the desktop system, the chipset, memory, and graphics components are increasing in power creating a greater cooling demand. In order to meet the increasing system thermal needs, the current ATX and micro-ATX systems require either additional airflow or heat sinks to maintain the necessary junction temperatures for the components. The recommended low cost solution in ATX and micro-ATX systems is to provide a Low Profile Fan Duct that impinges high velocity cool external air directly on the Core Logic Components (processor, chipset, graphics, graphics controller, and memory).

4 Motherboard Requirements

This section provides the necessary information for designers to layout and place components on a motherboard that will utilize a Low Profile Fan Duct system. The component location requirements are provided in **Section 4.1** and the component height requirements and heat sink height requirements are provided in **Section 4.2** and shown in **Figure 2**.

4.1 Component Location Requirements

4.1.1 Graphics Location

The Low Profile Fan Duct system requires component layout restrictions on the Accelerated Graphics Port (AGP) connector and soldered down graphics chip. If there is an AGP connector, the connector must be located in either Slot 6 or Slot 7 of the ATX and micro-ATX specification. If there is a soldered down graphics solution, the graphics chip must be located within the boundary indicated in **Figure 1**.

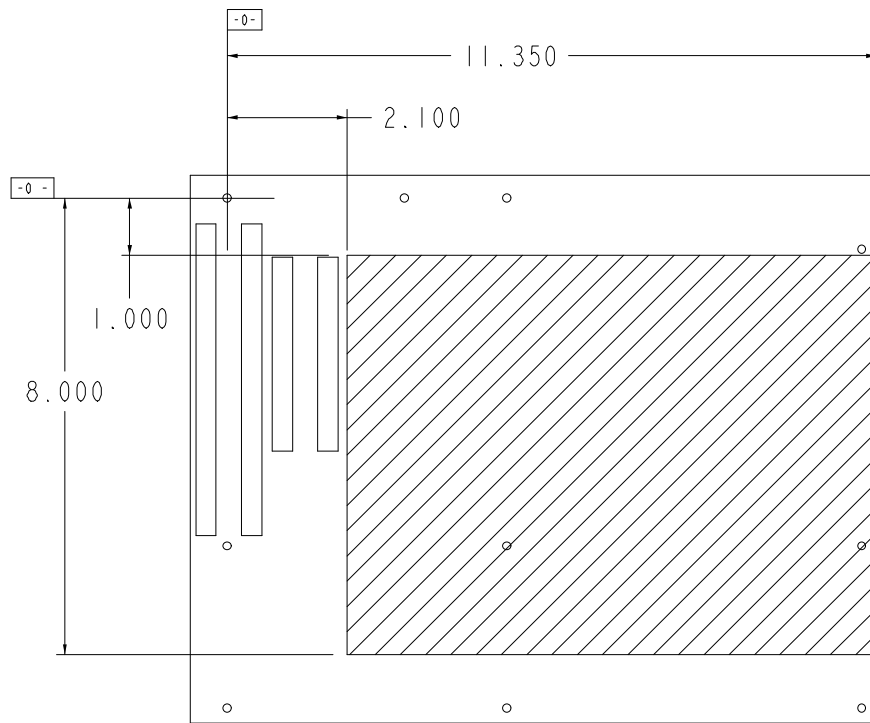


Figure 1. Restricted Area for the AGP Down Configuration.

4.1.2 Memory and Chipset Location Requirements

The memory and chipset must be located within areas A1 through A3, as specified by the keep out drawing shown in **Figure 2**.

4.2 Component Height Restrictions

The component height restrictions on the motherboard are required to accommodate the Low Profile Fan Duct system.

4.3 Processor Heat Sink Height Restrictions

The processor Low Profile Heat Sink and attachment mechanisms must adhere to the keep-out requirements shown in **Figure 2**. For additional information see the *Low Profile Fan Duct Design Guidelines*.

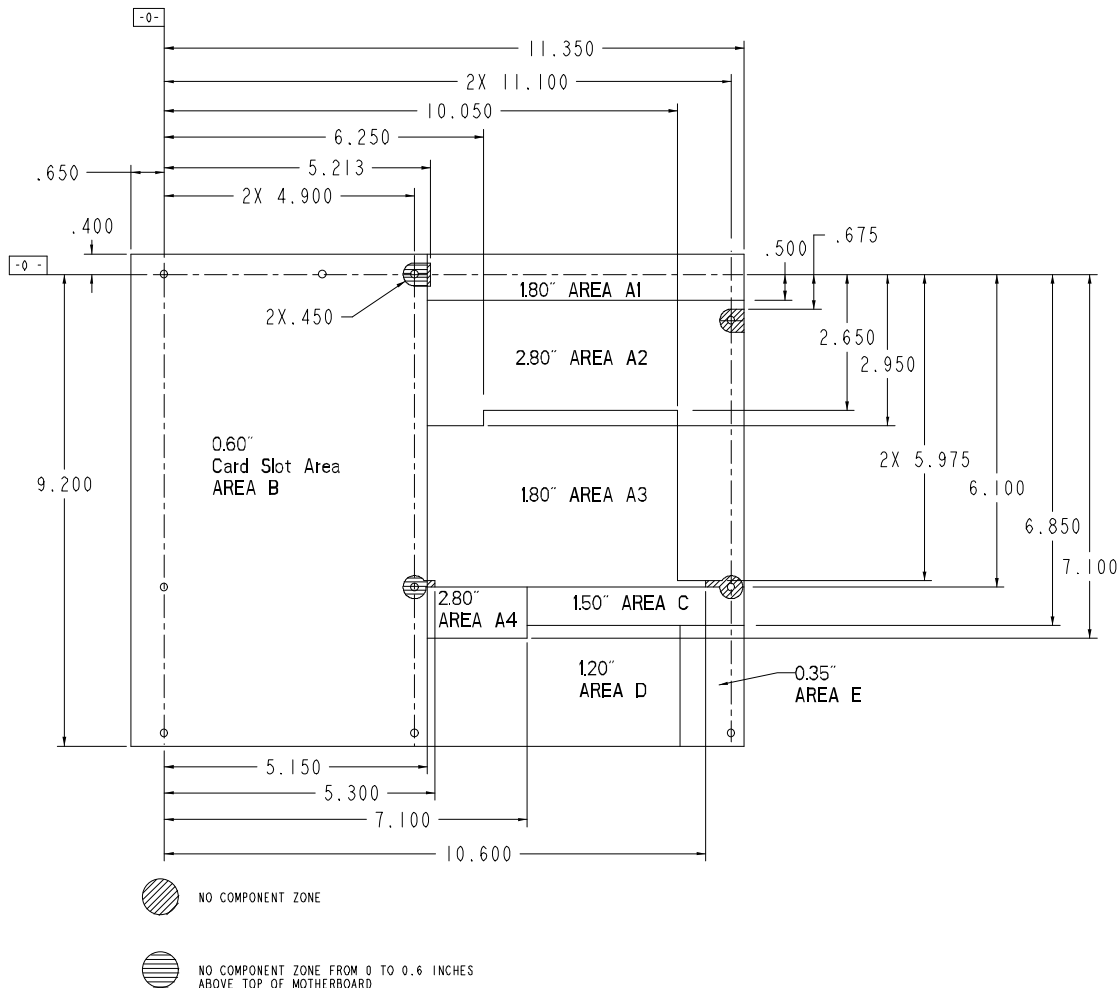


Figure 2. Low Profile Fan Duct system keep-out zones for the motherboard.

5 Chassis Requirements

The chassis requirements for the Low Profile Fan Duct system provide an inlet venting area and a keep out volume. The keep out volume defined in **Figure 3** shows the maximum volume of the assembled Low Profile Fan Duct, including tolerances.

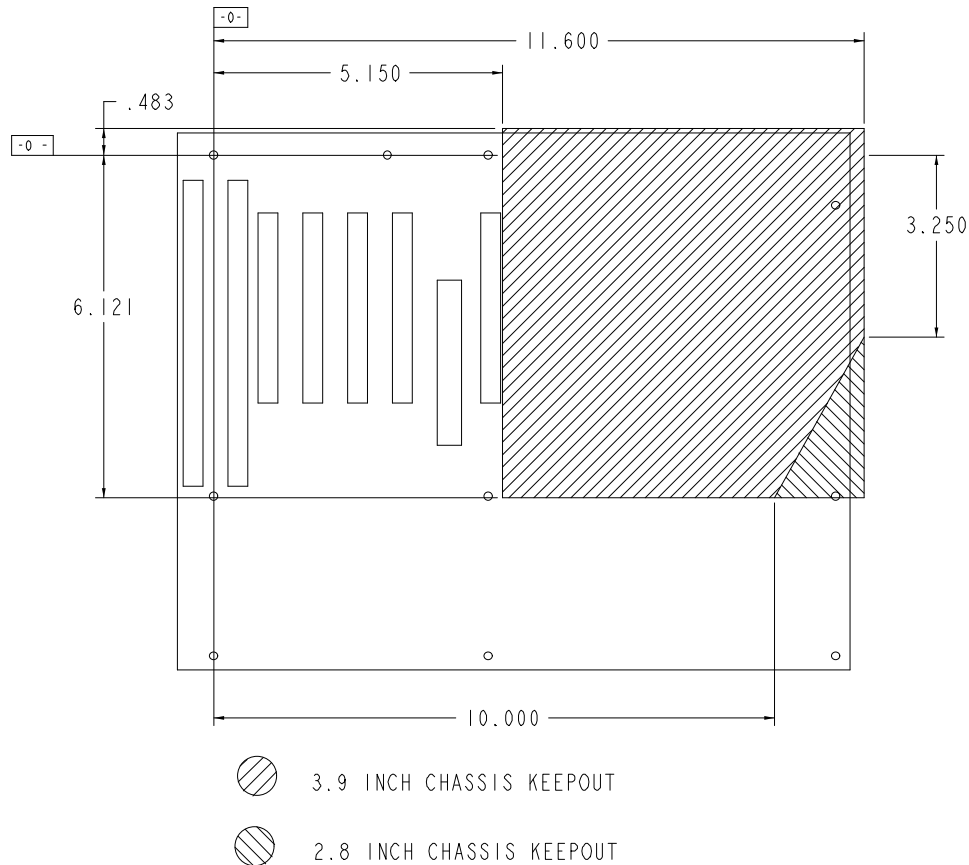


Figure 3. Low Profile Fan Duct System Area Keep-Out Volume
(Chassis keep-outs are dimensioned from the top of the motherboard)

In order to balance airflow and EMI containment, the size of the vent hole openings and the spacing between holes is limited. One metric for gauging venting of perforated metal is by the percent open. This is defined by the open area (the open area is the summation of the hole openings in a given area) divided by the total area (area of holes plus solid metal between holes). This is an averaged value. For the Low Profile Fan Duct to be able to deliver full performance, the vent area must be a minimum of 50% to a maximum of 60% open. For EMI containment and to prevent dust clogging of the vent, hole dimensions must be in the range of 0.12 inches to 0.17 inches (3.0 mm to 4.3 mm).

The vent must be placed within the area shown in **Figure 4a**. In order to allow mating the Low Profile Fan Duct to the vent area, there may be no components or features within the keep-out area surrounding the vent, as shown in the shaded area of **Figure 4a**. Since many chassis have varying motherboard to back panel distances in the location of the vent, the Low Profile Fan Duct requires a maximum and minimum distance between the “0” datum and the inlet vent, as shown in **Figure 4b**. See the *Low Profile Fan Duct Design Guidelines* for more information and recommendations.

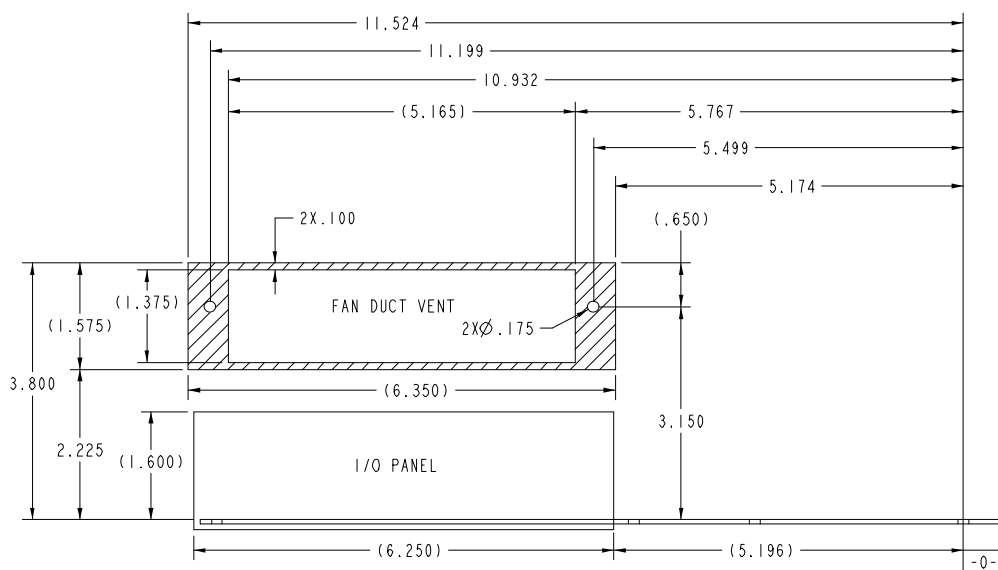


Figure 4a Inlet Venting Location for the Low Profile Fan Duct System
(Crosshatched area shows the keep out zone for the Fan Duct on the back panel)

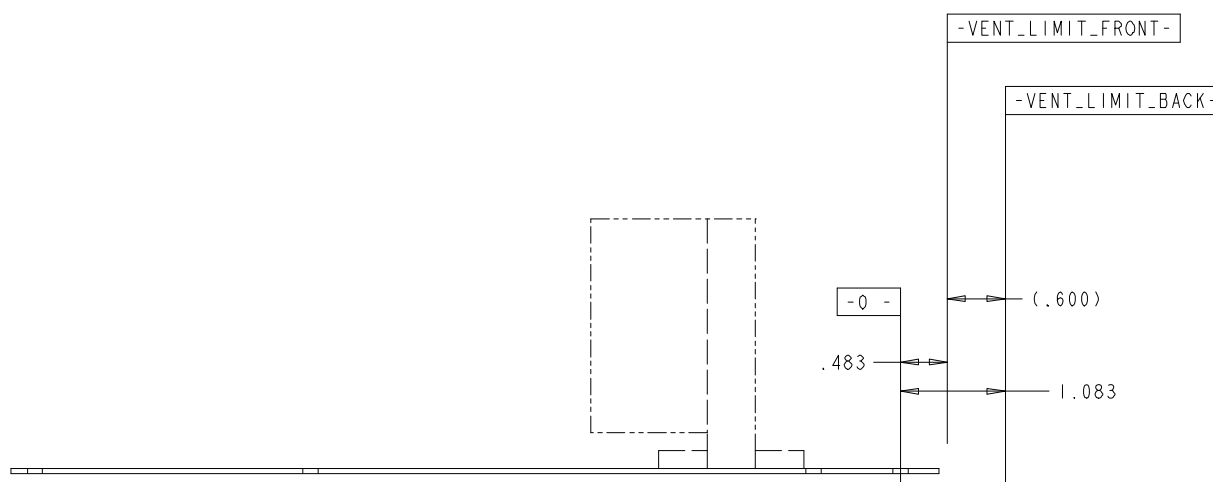


Figure 4b. Vent Location Variation with Respect to Datum 0 on the Motherboard